

Earned Value Management Systems 32 Criteria

Category 1: Organization

Number	Criteria Discretion	Description on how BTeV complies with the criteria
1-1	Define the authorized work elements for the program. A work breakdown structure, tailored for effective internal management control, is commonly used in this process.	1) Uses Welcom OpenPlan project planning software to generate WBS structure. The WBS is defined to appropriate levels for all subprojects, typically to between levels 5-7. 2) PPEP Section 5 describes the WBS to Level 2
1-2	Identify the program organizational structure, including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.	1) PPEP Section 5 describes the OBS to Level 2. The WBS and OBS from Level 1 down are very similar. WBS 1.0 is not part of the OBS, but that is the only significant difference. 2) The relation between the OBS and WBS is further defined in PPMP Section 3 by the addition of additional advisory groups. 3) The Collaborating universities are major subcontractors in the Project. Universities or INFN are the lead institution for four of the Level 2 projects, which are led and staffed by collaborators from those universities. The MOU and SOW process for the universities and FNAL will specify the authorized work, the organizational structure and detail all required reporting and accounting practices required.

Category 1: Organization

Number	Criteria Discretion	Description on how BTeV complies with the criteria
1-3	Provide for the integration of the company's planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.	1) PMSD Section 3.6 describes the use of Welcom OpenPlan and Welcom COBRA to do integrated cost and schedule management. 2) PMSD Section 4.5 describes the work packages created from the Project schedule, their outline, and how they are authorized.
1-4	Identify the company organization or function responsible for controlling overhead (indirect costs).	1) PMSD Appendix B describes the overhead policy at FNAL in general, for large procurements, and for pass through funding. 2) Allowable indirect costs at universities will be specified and agreed to in MOU's between the universities and FNAL.
1-5	Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.	1) PPEP Section 5 describes the WBS and OBS to Level 2. 2) PMSD Section 3 states that both OP and COBRA are based on the WBS. Using COBRA it is possible to extract budget information based on WBS or institution or both.

Category 2: Planning and Budgeting

Number	Criteria Discretion	Description on how BTeV complies with the criteria
2-1	Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.	1) PMSD Section 3.4 describes steps used create the schedule in OpenPlan, from identifying all work to be done, to resource leveling, identifying significant task interdependencies, and integration into COBRA. . 2) Most interdependency issues reside in WBS 1.10, I&I, whose major task is their resolution.
2-2	Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.	1) PPEP Section 7.4 Identifies the Tier 0 and 1 milestones agreed upon by the DOE, FNAL management, and the BTeV Project. 2) PPMP Section 6.2.2 identifies, in addition to the Tier 0 and 1 milestones, the Tier 2 and 3 Milestones. The Tier 4 and 5 milestones are owned by the project, and defined by the WBS managers.
2-3	Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost, including estimates for authorized but undefinitized work. On government contracts, if an over-target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.	1) PMSD Section 3.4 describes the development of the resource-loaded, resource leveled schedule. 2) The higher level “planning package” budge allocation method is not used at FNAL. We plan everything in detail at the outset for the duration of the project. 3) The Project Schedule Officer is responsible for maintaining the detailed schedule baseline in Welcom OpenPlan, and the Project Budget Officer is responsible for maintaining the cost estimate in Welcom COBRA.

Category 2: Planning and Budgeting

Number	Criteria Discretion	Description on how BTeV complies with the criteria
2-4	Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.	1) PMSD Section 3.2 describes the Base Cost development by the WBS managers. 2) PMSD Section 3.3 describes escalation rates 3) PPMP Section 6.4 describes the contingency calculation process
2-5	To the extent it is practical to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.	1) Resource loaded schedule in OP used to describe all work in project down to lowest level. All efforts can be rolled up to any level desired. Information from OP is imported into COBRA. 2) All Cost Accounts are made up from Work Packages.
2-6	Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.	1) PSMD Section 4.5 states that the sum of the actual costs for the work packages completed and the funding authorized to all open work packages cannot exceed the cumulative budget for the BTeV Project. The project accounting tools will ensure this.
2-7	Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is unmeasurable or for which measurement is impractical may be classified as level of effort.	1) PMSD Section 4.3 describes when the LOE method may be used.
2-8	Establish overhead budgets for each significant organizational component of the company for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.	1) PMSD Appendix B describes the FNAL overhead policies as they apply to Projects. 2) Overhead is applied to COBRA to generate the project cost.

Category 2: Planning and Budgeting

Number	Criteria Discretion	Description on how BTeV complies with the criteria
2-9	Identify management reserves and undistributed budget.	1) The baseline does not include a management reserve but does have project contingency. 2) The baseline does not have any undistributed budget.
2-10	Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.	1) The CPR will provide monthly verification of actual and budgeted costs for the life of the project.

Category 3: Accounting Considerations

Number	Criteria Discretion	Description on how BTeV complies with the criteria
3-1	Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.	1) Financial data accumulation and costing will be done using the FNAL standard financial systems. 2) PSMD Section 5.2 describes how actual costs for labor, vendor invoices and overhead are entered into the accounting system.
3-2	When a work breakdown structure is used, summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.	1) Work packages will be opened at the lowest WBS levels, and are used to specify deliverables. Cost accounts are used by project participants to charge time and other allowable charges to a project. The Cost Account usually comprises work packages and is the lowest summation level in the Work Breakdown Structure. 2) BTeV has not set the cost account level to a uniform WBS level – we generated the cost accounts at the level where they made sense, but that is different for different parts of projects.
3-3	Summarize direct costs from the control accounts into the contractor's organizational elements without allocation of a single control account to two or more organizational elements.	1) Actual costs are imported into Welcom COBRA directly from the lab financial system every month, as described in the PMSD, section 3.6. COBRA can summarize this data down to the Cost Account level.

Category 3: Accounting Considerations

Number	Criteria Discretion	Description on how BTeV complies with the criteria
3-4	Record all indirect costs which will be allocated to the contract.	<p>1) The standard FNAL Oracle based accounting system tracks all overhead costs applied to the project and reports them to the project on a monthly basis. The basis by which the lab applies overheads is described in the PMSD, Appendix B.</p> <p>2) For contracts to universities, the standard invoices from them must contain the university overhead that has been included in the invoice and as specified in the MOU and SOW between them and FNAL.</p>
3-5	Identify unit costs, equivalent units costs, or lot costs when needed.	The schedule baseline prepared in Welcom OpenPlan calculates labor in hours for university and lab personnel and calculates costs based on hourly rates for different job classifications. For purchases of materials, the standard procurement procedure is to specify a total cost based on unit cost. To compare actual and planned unit costs, the standard monthly cost reports prepared using the lab's financial system are provided to the project office for review.

Category 3: Accounting Considerations

Number	Criteria Discretion	Description on how BTeV complies with the criteria
3-6	<p>For EVMS, the material accounting system will provide for</p> <ul style="list-style-type: none"> — accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques; — cost performance measurement at the point in time most suitable for the category of material involved, but no earlier than the time of progress payments or actual receipt of material; and — Full accountability of all material purchased for the program including the residual inventory. 	<p>1) Costs of materials purchased are accrued in the lab financial system when the materials have been received and recorded by the lab receiving department.</p> <p>2) Costs of materials purchased through subcontract awards (typically through universities) will also only be accrued after receipt and recording of goods by the subcontractor.</p> <p>3) Service requests to FNAL support organizations are also use to procure materials. Those costs are accrued using Cost Accounts, which have a direct and well defined relationship to the WBS on a monthly basis using the lab financial service.</p> <p>4) Costs must be incurred or accrued through the FNAL accounting system before value can be earned.</p> <p>5) Equipment purchased by the BTeV Project using DOE funds will become the property of FNAL. All electronics material purchased, including commercial switches, processors, electronics crates and circuit boards will be entered into and tracked using the Computing Divisions equipment database. All hardware components will be under the supervision and control of the BTeV Project, until it is superceded by the BTeV Operations Department.</p>

Category 4: Analysis and Management Reports

Number	Criteria Discretion	Description on how BTeV complies with the criteria
4-1	<p>At least on a monthly basis, generate the following information at the control account and other levels as necessary for management control using actual cost data from, or reconcilable with, the accounting system.</p> <ul style="list-style-type: none"> — Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance. — Comparison of the amount of the budget earned the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance. 	<p>1) Welcom COBRA will be used to produce monthly, standard, EVMS reports and graphs that will present both cumulative and monthly BCWS, BCWP, ACWP, variances, and other information as needed. The data will be used by the project office to determine project status and determine corrective action when needed, and will be given to all Level 2 managers for use in measuring subproject status.</p>
4-2	<p>Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management.</p>	<p>1) Monthly reports with variances between both planned and actual schedule performance and planned and actual cost performance, will be generated by the project office, as described in the PMSD, Section 5.</p> <p>2) In cases where both the dollar threshold and the CPI/SPI limits are exceeded, written variance reports are required. It is the responsibility of the appropriate WBS manager to provide the required variance reports to the Project Manager, and to develop and implement corrective action plans, if needed.</p> <p>3) The variance analysis section of the monthly report to DOE contains the BTeV Project Manager's summary of the significant variances, their causes, their likely impacts, and a description of corrective action(s) taken or planned. Significant cost variances likely to be sustained will be reflected in the EAC.</p>

Category 4: Analysis and Management Reports

Number	Criteria Discretion	Description on how BTeV complies with the criteria
4-3	Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances.	<p>1) Planned and Actual indirect costs will be reported in the monthly CPR prepared by the BTeV Budget Officer. This information will be given to the Project Manager and the Level 2 managers. OK.</p> <p>2) Because the indirect rates are fixed by the lab, there should be no rate variances. Any cost variances should be the result of cost variance in the procured material or labor. Cost variances in excess of the thresholds specified in the PMP, Section 7.4, will be reported and corrected as appropriate.</p>
4-4	Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the contract.	<p>1) Welcom COBRA will be used by the BTeV Budget Officer to produce monthly, standard, EVMS reports and graphs that will present both cumulative and monthly BCWS, BCWP, ACWP, variances, and other information as needed.</p> <p>2) These monthly reports with both planned and actual schedule performance and planned and actual cost performance and variances, will be distributed to the project manager and all Level 2 managers.</p> <p>3) The report described above will be used as the basis of the monthly report submitted to the Department of Energy. In addition to the financial data, the report, generated by the Project Manager, will contain a summary of the variances, their cost and schedule impact, their causes and a description of the corrective action needed.</p>

Category 4: Analysis and Management Reports

Number	Criteria Discretion	Description on how BTeV complies with the criteria
4-5	Implement managerial actions taken as the result of earned value information.	1) The Technical board meeting following the production of the monthly CPR will be devoted to reports and discussion of all cost and schedule variances, as described in the PMSD, Section 5.5. Plans for needed corrective action will be developed in the Level 2 managers weekly meetings and presented to the Technical Board for discussion and approval by the PM. It is the Level 2 managers responsibility to understand, monitor, and report on the corrective actions to the Technical Board until the variance is resolved.
4-6	Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements.	1) Each month, COBRA projects and reports the EAC as the sum of the actual costs to date plus the current BCWS for remaining work. 2) A comprehensive “bottoms-up” reevaluation of ETC may be initiated at any time at the discretion of a WBS manager (for his/her system), of BTeV Management, or of DOE. The method used to prepare this estimate is the same as was used to prepare the original base estimate. 3) As described in the PMSD, Section 4.7, it is expected that the BTeV Project will make such estimates prior to annual or semi-annual DOE reviews.

Category 5: Revisions and Data Maintenance

Number	Criteria Discretion	Description on how BTeV complies with the criteria
5-1	Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.	<p>1) After a PCR is approved at the appropriate level, as described in the PMSD, Section 10.2, including directed changes, the Project Manager is responsible for the administrative operation and coordination of the overall baseline change control system in support of all BTeV Project participants.</p> <p>2) Upon approval of the PCR, the baselines will be modified to reflect the scope, cost, and schedule impacts of the directed change.</p> <p>3) For directed changes by the DOE, where the real impact may not be known for some time, estimated amounts will be used in planning and management.</p>
5-2	Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.	<p>1) The TCSSA form, shown in the PMSD, Appendix A, which accompanies the PCR, is used to evaluate the cost and schedule impact of the proposed change.</p> <p>2) The Level 2 manager of the affected subproject will make the initial review of the PCR and TCSSA and provide an analysis of the differences between the baseline work packages, cost and schedule, and the proposed new ones.</p>
5-3	Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments, effects of customer or management directed changes, or to improve the baseline integrity and accuracy of performance measurement data.	<p>1) Retroactive changes to records will be limited to correction of errors. In general, baseline changes are only able to change future work, and are not allowed to retroactively change previously reported EV calculations.</p>

Category 5: Revisions and Data Maintenance

Number	Criteria Discretion	Description on how BTeV complies with the criteria
5-4	Prevent revisions to the program budget except for authorized changes.	<p>1) PCR's must be documented, reviewed, and approved at the appropriate levels before the baseline will be modified at any level, as described in the PSMD, Section 2.</p> <p>2) Only when the PCR is approved by the appropriate level change official does it become a Change Order and is transmitted to the Project Manager. The PM will update the Change Log, ensure the baselines are modified appropriately, and communicate the action to all affected project participants.</p>
5-5	Document changes to the performance measurement baseline.	<p>1) Each PCR is assigned a unique identifier, and after approval, a change log entry tied to that identifier is made. The PCR identifies each affected WBS task in the baseline, and each of those tasks will receive a revision number, as described in the PMSD, section 10.2.</p> <p>2) The PCR's and TCSSA's will be stored electronically and in hard copy for the duration of the project using the BTeV document database.</p> <p>3) Each baseline file is archived for the duration of the project.</p>